CLAIMS

1. A PDP apparatus comprising a panel unit and a driving unit, the panel unit including a first substrate on which a plurality of pairs of first and second electrodes are formed and a second substrate on which a plurality of third electrodes are formed, the first substrate and the second substrate being opposed to each other with a discharge space therebetween so as to form discharge cells at areas where the plurality of pairs of first and second electrodes intersect the plurality of third electrodes, the driving unit driving the panel unit to display an image according to a display method that includes a write period and a sustain period, by, in the sustain period, applying a voltage to the plurality of pairs of first and second electrodes and applying a voltage to the plurality of third electrodes, the PDP apparatus being characterized in that

in the sustain period, voltage waveforms applied to the plurality of third electrodes differ in terms of a rise start timing which is set relative to a time at which the voltage applied to the plurality of pairs of first and second electrodes reaches a predetermined level.

2. The PDP apparatus of Claim 1, wherein

the plurality of third electrodes are divided into a plurality of groups each of which includes two or more third electrodes, and

in the sustain period, the driving unit controls the rise start timing in units of groups.

3. The PDP apparatus of Claim 2, wherein

the driving unit includes:

a plurality of voltage applying circuit units which apply the voltage to the plurality of third electrodes in the sustain period; and

a timing signal generation unit that outputs a signal indicating the rise start timing, in the sustain period, to each of the plurality of voltage applying circuit units.

4. The PDP apparatus of Claim 1, wherein

in the sustain period, the driving unit controls the voltage waveforms applied to the plurality of third electrodes so as to start rising within a time period shorter than a half cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

5. The PDP apparatus of Claim 4, wherein

in the sustain period, the driving unit controls the voltage waveforms applied to the plurality of third electrodes so as to start rising, after a time at which the voltage applied to the plurality of pairs of first and second electrodes reaches a predetermined level, but before a time at which a discharge is generated by the voltage applied to the plurality of pairs of first and second electrodes when the voltage is assumed not to be applied to the plurality of third electrodes.

6. The PDP apparatus of Claim 5, wherein

in the sustain period, a voltage waveform applied to a first electrode and a voltage waveform applied to a second electrode paired with the first electrode have a same cycle, but are different from each other in terms of a timing of application, by half the cycle.

7. The PDP apparatus of Claim 1, wherein

in the sustain period, a voltage waveform applied to at least one of the plurality of third electrodes starts to fall at a different timing, from a voltage waveform applied to an

adjacent third electrode, which is set relative to a time at which the voltage applied to the plurality of pairs of first and second electrodes reaches a predetermined level.

8. The PDP apparatus of Claim 7, wherein

in the sustain period, the driving unit controls the voltage waveforms applied to the plurality of third electrodes so as to start falling within a time period shorter than a half cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

9. The PDP apparatus of Claim 1, wherein

when the voltage waveforms applied to the plurality of third electrodes in the sustain period are expressed using a time axis and a voltage axis, at least one of a rising portion and a falling portion of each of the voltage waveforms has a gradient, and

a voltage waveform applied to at least one of the plurality of third electrodes has a different gradient for at least one of a rising portion and a falling portion, from a waveform applied to an adjacent third electrode.

10. The PDP apparatus of Claim 9, wherein

a duration of at least one of the rising portion and the falling portion of the voltage waveform is shorter than a half cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

11. The PDP apparatus of Claim 1, wherein

each of the voltage waveforms applied the plurality of third electrodes in the sustain period is a pulse waveform of a substantially same width.

12. The PDP apparatus of Claim 1, wherein

the driving unit drives the panel unit by repeating a sub-field including the write period and the sustain period, and

the driving unit controls the rise start timing in units of sub-fields.

13. The PDP apparatus of Claim 12, wherein

two or more sub-fields constitute a sub-field group, and

the driving unit controls the rise start timing in units of sub-field groups.

14. The PDP apparatus of Claim 1, wherein

the driving unit drives the panel unit by repeating a sub-field including the write period and the sustain period, and a plurality of sub-fields constitute a field, and

the driving unit controls the rise start timing in units of fields.

15. The PDP apparatus of Claim 14, wherein

two or more fields constitute a field group, and

the driving unit controls the rise start timing in units of field groups.

16. The PDP apparatus of Claim 1, wherein

the write period and the sustain period constitute a sub-field, and a plurality of sub-fields constitute a field, and

for each of the voltage waveforms applied to the plurality of third electrodes, an average time period, in each sub-field or field, from a time at which the voltage applied to the plurality of pairs of first and second electrodes reaches a predetermined level to a time at which the voltage applied to the plurality

of third electrodes starts to rise is substantially same.

17. The PDP apparatus of Claim 1, wherein

in the sustain period, a cycle of the voltage waveforms applied to the plurality of third electrodes is equal to a half cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

18. The PDP apparatus of Claim 1, wherein

in the sustain period, a cycle of the voltage waveforms applied to the plurality of third electrodes is equal to a cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

19. The PDP apparatus of Claim 1, wherein

in the sustain period, a cycle of the voltage waveforms applied to the plurality of third electrodes is equal to an integral multiple of a cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

20. A driving method for a PDP apparatus including a panel unit including a first substrate on which a plurality of pairs of

first and second electrodes are formed and a second substrate on which a plurality of third electrodes are formed, the first substrate and the second substrate being opposed to each other with a discharge space therebetween so as to form discharge cells at areas where the plurality of pairs of first and second electrodes intersect the plurality of third electrodes, the driving method including a write period and a sustain period, and being used to display an image, by, in the sustain period, applying a voltage to the plurality of pairs of first and second electrodes and applying a voltage to the plurality of third electrodes, the driving method being characterized in that

in the sustain period, voltage waveforms applied to the plurality of third electrodes differ in terms of a rise start timing which is set relative to a time at which the voltage applied to the plurality of pairs of first and second electrodes reaches a predetermined level.

21. The driving method of Claim 20, wherein

the plurality of third electrodes are divided into a plurality of groups each of which includes two or more third electrodes, and

in the sustain period, the rise start timing is controlled

in units of groups.

22. The driving method of Claim 21, wherein

a voltage applying circuit that applies a voltage is connected to each of the plurality of groups of third electrodes, and

in the sustain period, the rise start timing is controlled in such a manner that a signal indicating the rise start timing is input into the voltage applying circuit.

23. The driving method of Claim 20, wherein

in the sustain period, the voltage waveforms applied to the plurality of third electrodes are controlled so as to start rising within a time period shorter than a half cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

24. The driving method of Claim 23, wherein

in the sustain period, the voltage waveforms applied to the plurality of third electrodes are controlled so as to start rising, after a time at which the voltage applied to the plurality of pairs of first and second electrodes reaches a predetermined

level, but before a time at which a discharge is generated by the voltage applied to the plurality of pairs of first and second electrodes when the voltage is assumed not to be applied to the plurality of third electrodes.

25. The driving method of Claim 24, wherein

in the sustain period, a voltage waveform applied to a first electrode and a voltage waveform applied to a second electrode paired with the first electrode have a same cycle, but are different from each other in terms of a timing of application, by half the cycle.

26. The driving method of Claim 20, wherein

in the sustain period, a voltage waveform applied to at least one of the plurality of third electrodes starts to fall at a different timing, from a voltage waveform applied to an adjacent third electrode, which is set relative to a time at which the voltage applied to the plurality of pairs of first and second electrodes reaches a predetermined level.

27. The driving method of Claim 26, wherein

in the sustain period, the voltage waveforms applied to

the plurality of third electrodes are controlled so as to start falling within a time period shorter than a half cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

28. The driving method of Claim 20, wherein

when the voltage waveforms applied to the plurality of third electrodes in the sustain period are expressed using a time axis and a voltage axis, at least one of a rising portion and a falling portion of each of the voltage waveforms has a gradient, and

a voltage waveform applied to at least one of the plurality of third electrodes has a different gradient for at least one of a rising portion and a falling portion, from a waveform applied to an adjacent third electrode.

29. The driving method of Claim 28, wherein

a duration of at least one of the rising portion and the falling portion of the voltage waveform is shorter than a half cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

30. The driving method of Claim 20, wherein

each of the voltage waveforms applied the plurality of third electrodes in the sustain period is a pulse waveform of a substantially same width.

31. The driving method of Claim 20, wherein

the panel unit is driven by repeating a sub-field including the write period and the sustain period, and

the rise start timing is controlled in units of sub-fields.

32. The driving method of Claim 31, wherein

two or more sub-fields constitute a sub-field group, and

the rise start timing is controlled in units of sub-field groups.

33. The driving method of Claim 20, wherein

the panel unit is driven by repeating a sub-field including the write period and the sustain period, and a plurality of sub-fields constitute a field, and

the rise start timing is controlled in units of fields.

34. The driving method of Claim 33, wherein

two or more fields constitute a field group, and

the rise start timing is controlled in units of field groups.

35. The driving method of Claim 20, wherein

the write period and the sustain period constitute a sub-field, and a plurality of sub-fields constitute a field, and

for each of the voltage waveforms applied to the plurality of third electrodes, an average time period, in each sub-field or field, from a time at which the voltage applied to the plurality of pairs of first and second electrodes reaches a predetermined level to a time at which the voltage applied to the plurality of third electrodes starts to rise is substantially same.

36. The driving method of Claim 20, wherein

in the sustain period, a cycle of the voltage waveforms applied to the plurality of third electrodes is equal to a half cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

37. The driving method of Claim 20, wherein

in the sustain period, a cycle of the voltage waveforms applied to the plurality of third electrodes is equal to a cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.

38. The driving method of Claim 20, wherein

in the sustain period, a cycle of the voltage waveforms applied to the plurality of third electrodes is equal to an integral multiple of a cycle of a waveform of the voltage applied to the plurality of pairs of first and second electrodes.